

No. 698,825.

Patented Apr. 29, 1902.

E. F. EDGAR.
BOILER.

(Application filed Apr. 10, 1899.)

(No Model.)

4 Sheets—Sheet 1.

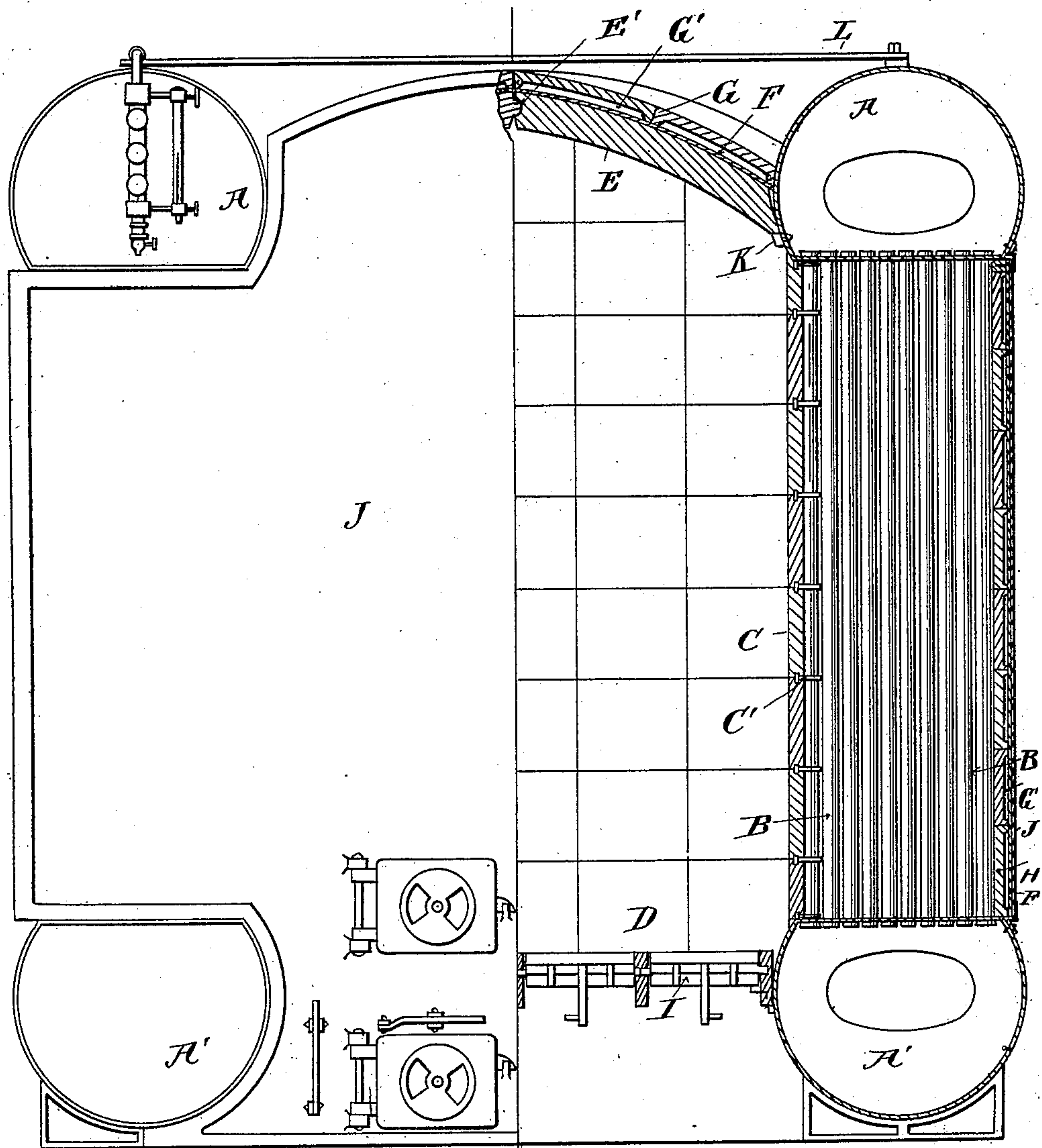


Fig. 1.

WITNESSES

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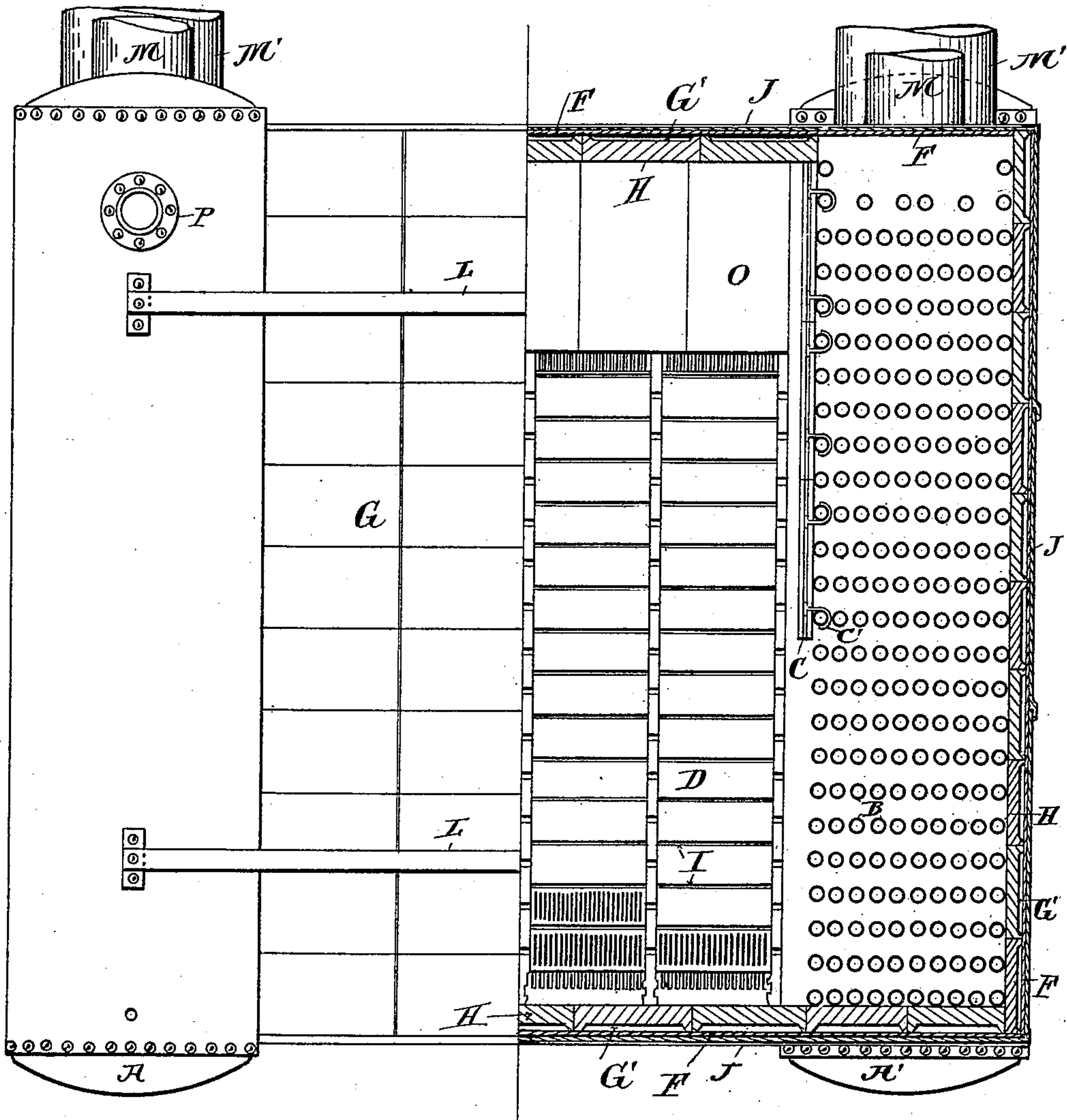


Fig. 2.

WITNESSES

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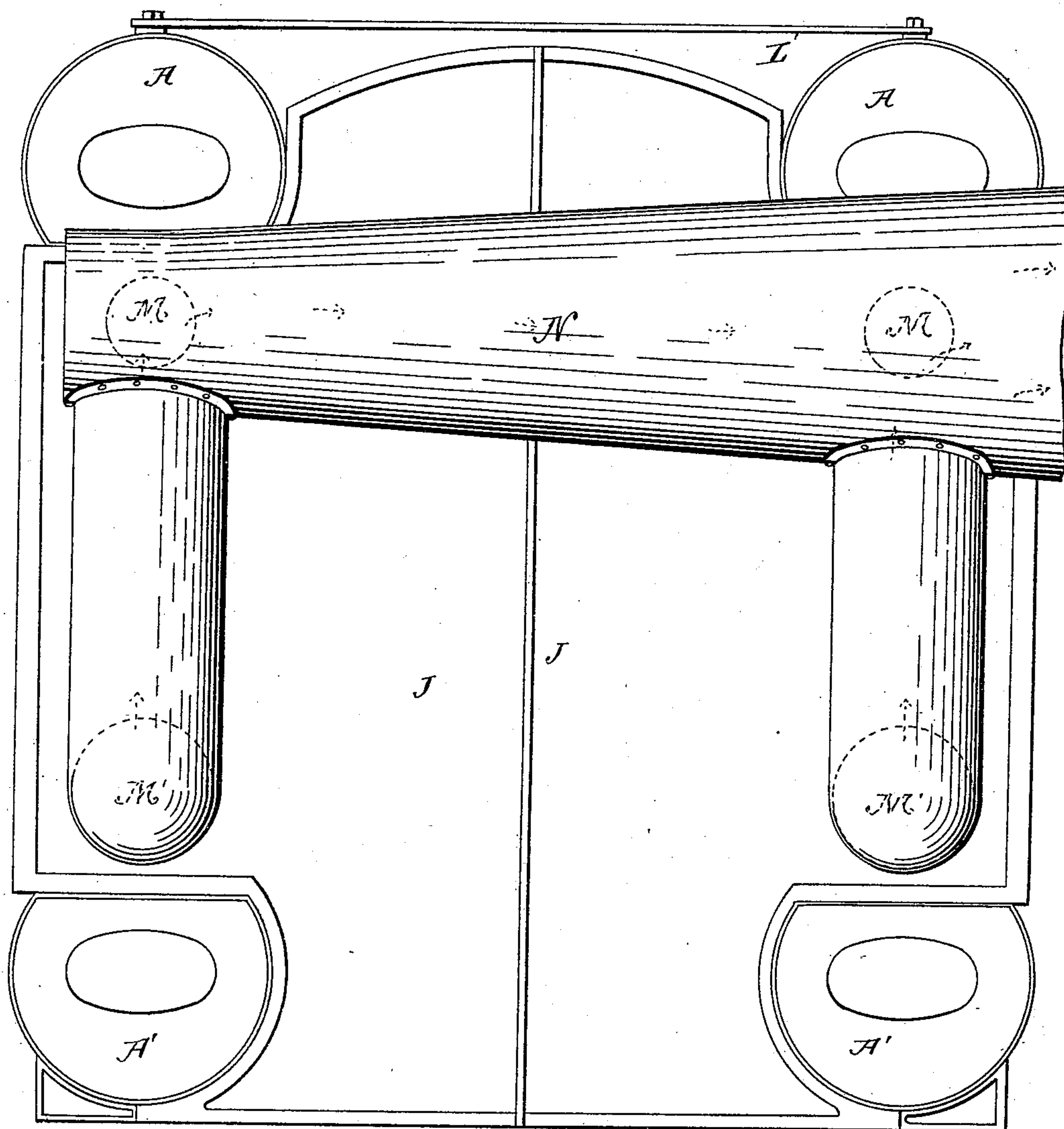


Fig. 3.

WITNESSES

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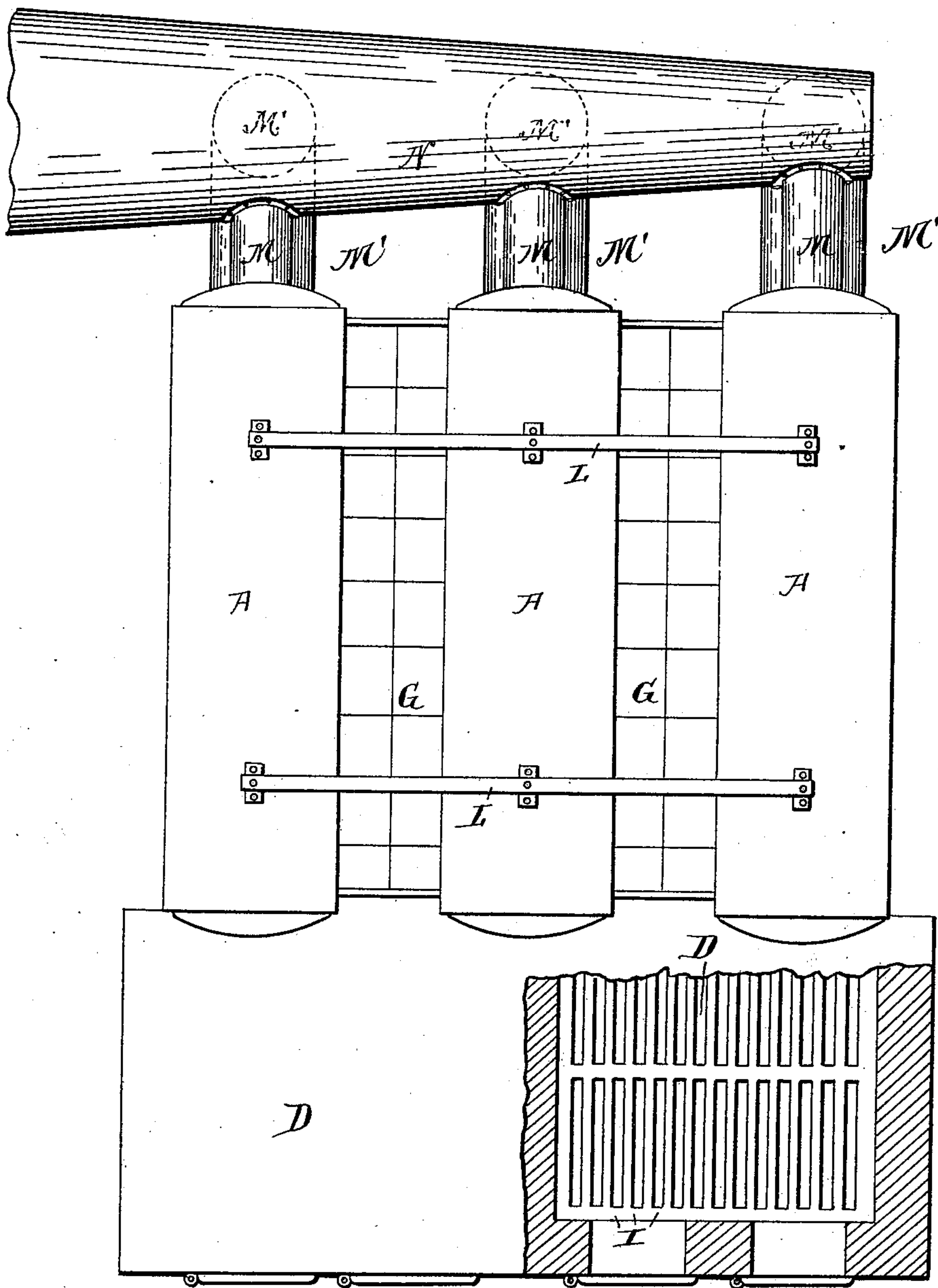


Fig. 4.

WITNESSES

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UNITED STATES PATENT OFFICE.

ELLIS F. EDGAR, OF WOODBRIDGE, NEW JERSEY.

BOILER.

SPECIFICATION forming part of Letters Patent No. 698,825, dated April 29, 1902.

Application filed April 10, 1899. Serial No. 712,573. (No model.)

To all whom it may concern:

Be it known that I, ELLIS F. EDGAR, a citizen of the United States, and a resident of Woodbridge, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Boilers, of which the following is a specification.

Figure 1 is a view of a boiler equipped with my improvements, partly in elevation and vertical cross-section. Fig. 2 is a view of the same, partly in plan and cross-section. Fig. 3 is a view of the rear end in elevation. Fig. 4 is a plan view, partly in section, of a three-section boiler.

My invention relates to a vertical water-tube boiler, usually four drums or more; may in some cases be only two drums. There is one upper drum A and one lower drum A' in a section. These drums are connected by water-tubes B, and a cast-iron casing J, incasing the water-tubes B on the outside, lined first with asbestos felting F, then with a special brick lining H, with a dead-air space G' in the said brick lining next to the asbestos felting F, a brick arch E, between the upper drums, forming the top of the furnace D or combustion-chamber. This brick arch E is also covered with asbestos felting F and has preferably tongue-and-groove joints E'. Next to the asbestos felting is a dead-air space G' in the brick covering G on the top of the asbestos felting. Between the furnace or combustion-chamber and the water-tubes that are located in the end of the boiler next to the draft-exit is a wall C, of brick or other non-combustible material, and extending from the lower drum to the upper drum and extending from the outside casing, in which are located the draft-exits M and M', usually about one-third to one-half of the way to the opposite end of the boiler and entirely inclosing the space in which the water-tubes are located that lie between the draft-exit and the far end of this wall, where the balance of the water-tubes are located, which are usually one-half or more of the total number of tubes. These tubes are exposed to the direct radiation of the heat from the furnace. There are usually two draft-exits in each section, which is composed of one upper and one lower drum connected by water-tubes, the large draft-exit near the lower drum and a smaller one near

the upper drum. These draft-exits extend through the outside casing into smoke-flues on the outside. In some cases the lower draft-exit it may be necessary to make oval to obtain the proper amount of draft area. Good results could be obtained with one draft-exit made oval; but I prefer to construct, as described, with two.

One of the important features of this boiler is in locating the steam-exit P at the draft-exit end of the section, as the water-tubes there, having very little temperature left in the gases passing between them, allows of the water to circulate down through these tubes to the lower drum, which prevents moisture in the steam, that would be caused if the steam-exit was located over or near the tubes at the other end of the section that are exposed to the higher temperature, which causes a circulation up, and in separating the steam from the water at the surface of the water in the upper drum there would be more or less danger of lifting water if the steam-exit was located over these tubes. I feed my feed-water in the lower drum at the draft-exit end of the section, allowing it to precipitate scaling properties in the lower drum before rising through the tubes in the opposite end, where the tubes are exposed to a higher temperature. This construction provides for perfect circulation, and in the highest rates of evaporation I always get dry steam. For high pressure I always construct with round drums.

The operation of this boiler: The coal being placed on the grate and ignited, the heated gases rise to the brick arch, which absorbs a given amount of heat, then reflects the heat back to the fire-bed, which causes a very high furnace temperature that is radiated and deflected among the tubes that are exposed on the side of the furnace or combustion-chamber, and the heat that is not absorbed by these tubes passes between the tubes that are in line of draft between these former tubes, that are exposed to the direct radiation from the furnace and the draft exits, and is absorbed before reaching the draft-exits to any desired temperature required by varying the length of the inclosing wall C.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination in a vertical water-tube boiler of one or more oblong sections, composed of one upper and one lower drum connected by water-tubes, and an open furnace or combustion-chamber on one or both sides of said section and extending the length of said section and an outside casing at each end of said furnace or combustion-chamber and extending over the ends of said section and a draft-exit in one of the said outside casings at one end of the said section, and in line with the tubes and an inclosing wall extending from the outside casing containing the draft-exit at the end of the said section part of the way to the other outside casing at the other end of the said section and closing communication to the tubes that lie back of said wall and between the draft-exit in the outside casing at the end of the said section, except through the tubes that are located in the opposite end of the said section from the draft-exit and between the inclosing wall and the opposite outside casing, all substantially as shown and described and for the purpose set forth.

2. In a vertical water-tube boiler the combination of a casing and upper and lower drums, water-tubes connecting the said drums, a combustion-chamber, a smoke-outlet in the casing near the lower drum in line with the water-tubes, a second outlet of smaller size located near the upper drum and a wall extending from the side of the casing containing the outlets, forwardly toward the opposite side of the boiler a part of the way; said wall closing communication between the combustion-chamber and the space containing the water-tubes on the other side of said wall, except at the end of said wall.

3. In a boiler-furnace the combination of cast-iron casing J, a lining therefor comprising asbestos felt F, bricks H, the arch-section E, provided with a tongue-and-groove connection, lugs K upon which said section rests, bricks G resting upon the section E and the tie-rods L.

4. The combination in a vertical water-tube boiler of one or more oblong sections composed of one drum above another connected by water-tubes, a furnace or combustion-chamber on one or both sides of said sections, an outside casing extending across the ends of said furnace or combustion-chamber and across the end of said section or sections, and a draft-exit in one of said outside casings at one end of the said sections and in line with the tubes and an inclosing wall C extending from the outside casing containing the draft-exit part of the way to the other outside casing and closing communication to the tubes

that lie back of the said wall, except at the end of said wall, and a steam-exit P in the top of the upper drum at the draft-exit end of the said section, all substantially as shown and described and for the purpose set forth.

5. The combination in a vertical water-tube boiler of one or more oblong sections composed of one drum above another connected by water-tubes, a furnace or combustion-chamber on one or both sides of said sections, an outside casing extending across the ends of said furnace or combustion-chamber and around said sections and across the end of said sections, said outside casing being composed of cast-iron J, special brick H, draft-exits M, M' located in said outside casing at one end of said section and in line with tubes and steam-exit P in top of upper drum at same end and an inclosing wall C extending from the outside casing at the same end part of the way to the opposite end of furnace or combustion-chamber to the other outside casing, substantially as shown and described and for the purpose set forth.

6. The combination in a vertical water-tube boiler of an oblong section composed of one drum above another and connected by water-tubes, the upper drum having no other means of support except the water-tubes on which it rests, said water-tubes forming the heating-surface of the boiler, a furnace or combustion-chamber on one or both sides of said section, a draft-exit at one end of said section and the tubes next to the draft-exit being cut off from the heat from the furnace or combustion-chamber except through the tubes open to the furnace or combustion-chamber.

7. The combination in a vertical water-tube boiler of three or more oblong sections composed of one drum above another connected by water-tubes, the upper drum having no other means of support except the water-tubes on which it rests which form the heating-surface of the boiler, and furnaces or combustion-chambers between the said sections, and a draft-exit at one end of each of said sections and the tubes next to the draft-exits being cut off from the heat of the furnaces or combustion-chambers except through the tubes open to the furnace or combustion-chambers.

Signed at city of New York, in the county of New York and State of New York, this 28th day of March, A. D. 1899.

ELLIS F. EDGAR.

Witnesses:

CHAS. W. BENJAMIN,
CHAS. G. HENSLEY.